



International Journal of Production Research >

Volume 52, 2014 - [Issue 2](#)

1,322 87

Views | CrossRef citations to date | Altmetric

0

Articles

# Reduction of power consumption and carbon footprints by applying multi-objective optimisation via genetic algorithms

Cheng-Hsiang Liu & Ding-Hsiang Huang

Pages 337-352 | Received 24 May 2012, Accepted 26 Jun 2013, Published online: 12 Aug 2013

Cite this article <https://doi.org/10.1080/00207543.2013.825740>



Sample our  
Engineering & Technology  
Journals  
>> [Sign in here](#) to start your access  
to the latest two volumes for 14 days

Full Article

Figures & data

References

Citations

Metrics

Reprints & Permissions

Read this article

Share

## Abstract

Firms heavily emphasise reducing carbon footprint, an area warranting further improvement. This study examines carbon footprint within the context of production scheduling. Two multi-objective scheduling problems involving economic- and environmental-related criteria are studied: (1) a batch-processing machine scheduling problem to minimise the total weighted tardiness and carbon footprint simultaneously; (2) a triple-criteria scheduling problem involving of a hybrid flow shop consisting of a batch-processing machine followed by two parallel-processing machines, in which the shop attempts to minimise the total weighted tardiness, carbon footprint and peak power. Since the above problems are treated as a true multi-objective optimisation problem, decision-makers should select a solution among the trade-off solutions provided in the Pareto-optimal set. Therefore, the non-dominated sorting-based genetic algorithm II (NSGA-II) is implemented, which identifies the set of approximate efficient

schedules to both multi-objective scheduling problems. Moreover, an adaptive multi-objective genetic algorithm (AMGA) is developed to generate the reference Pareto front, which validates the results that are obtained using NSGA-II. Results of this study demonstrate both the effectiveness of AMGA in converging to the true Pareto-optimal set and the efficiency of NSGA-II.

Keywords:

- scheduling
- carbon footprint
- total weighted tardiness
- multi-objective genetic algorithms

Related Research Data

Metaheuristic multiobjective optimisation approach for the scheduling of multiproduct batch chemical plants

Source: Journal of Cleaner Production

A framework to minimise total energy consumption and total tardiness on a single machine

Source: International Journal of Sustainable Engineering

Focusing in by-product recovery and waste minimization in batch production scheduling

Source: Computers & Chemical Engineering

Environmentally benign manufacturing: Observations from Japan, Europe and the United States

Source: Journal of Cleaner Production

An efficient constraint handling method for genetic algorithms

Source: Computer Methods in Applied Mechanics and Engineering

A New Shop Scheduling Approach in Support of Sustainable Manufacturing

Related research ⓘ

People also read

Recommended articles

Cited by  
87

## Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

## Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

## Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

## Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

## Keep up to date

Register to receive personalised research and resources by email



Sign me up



Copyright © 2025 Informa UK Limited [Privacy policy](#) [Cookies](#) [Terms & conditions](#)

[Accessibility](#)



Taylor & Francis Group  
an informa business

Registered in England & Wales No. 01072954  
5 Howick Place | London | SW1P 1WG